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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/606,176

06/25/2003

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EXAMINER

NADAV, ORI

ART UNIT

PAPER NUMBER

2811

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

03/15/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/606,176

Applicant(s)

GOTO ET AL.

Examiner

Ori Nadav

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 January 2007.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 146-171, 173 and 175-219 is/are pending in the application.
- 4a) Of the above claim(s) 146-170 and 177-205 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 171, 173, 175, 176 and 206-219 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 8/25/06
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 206-209 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no support in the embodiment of figure 6 for a cap layer having a band gap always larger than that of the p-type clad layer, as recited in claim 206.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 171, 173, 175-176, 206-219 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schetzina (5,670,798) in view Ibbetson et al. (6,515,313).

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Regarding claims 171, 173, 175-176, 210-219, Schetzina teaches in figure 5 and related text a semiconductor light emitting device comprising:

- an active layer 112 InGaN made of a first nitride III-V compound semiconductor containing In and Ga;

- an optical guide layer GaN in contact with the active layer and made of a second nitride III-V compound semiconductor containing Ga (column 10, lines 31-34);

- a cap layer AlGaN 114a in contact with the optical guide layer and made of a third nitride III-V compound semiconductor containing Al and Ga; and

- a p-type clad layer AlGaN 222a in contact with the cap layer and made of a fourth nitride III-V compound semiconductor containing Al and Ga and different from the third nitride III-V compound semiconductor, wherein

- the p-type clad layer comprises a superlattice clad layer, the cap layer has a band gap always larger than that of the p-type clad layer (see figure 6A), and wherein the cap layer is  $\text{Al}_y\text{Ga}_{1-y}\text{N}$  (where  $0 \leq y < 1$ ), and

- wherein the superlattice clad layer comprises alternately stacking AlGaN and GaN layers.

Schetzina does not teach the thickness of the cap layer, which is located between the active layer and the cladding layer.

Schetzina teaches in the embodiment of figure 30 the thickness of the active layer 112c as being between 3-10 nm, and the thickness of the barrier layer 112a located between the active layer and the cladding layer 114c as being 20-100 nm.

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Ibbetson et al. teach in the embodiment of figure 3A the thickness of the cladding layer 4 between 1-100 nm.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a cap layer, located between the cladding layer and the active layer, having a thickness between 2-20 nm, in Schetzina's device, in order to reduce the size of the device without compromising the characteristics of the device, and in order not to deviate from the disclosed thicknesses of the various layers which determine the overall size of Schetzina's device.

It has been held in that the applicant must show that a particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Note that the law is replete with cases in which when the mere difference between the claimed invention and the prior art is some dimensional limitation or other variable within the claims, patentability cannot be found. The instant disclosure does not set forth evidence ascribing unexpected results due to the claimed dimensions. See Gardner v. TEC Systems, Inc., 725 F.2d 1338 (Fed. Cir. 1984), which held that the dimensional limitations failed to point out a feature which performed and operated any differently from the prior art.

Note further that the broad recitation of the claim does not require the layers to be in direct contact with each other.

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Regarding claims 175, 213 and 217, Schetzina teaches in the embodiment of figure 5 substantially the entire claimed structure, as applied to claim 171 above, except an undoped optical guide layer. Schetzina teaches in the embodiment of figure 29 an undoped optical guide layer 124c. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use an undoped optical guide layer in Schetzina's device in order to use the device in an application which requires an undoped optical guide layer.

Regarding claims 176, 214 and 218, Schetzina does not teach an optical guide layer having a thickness equal to or more than 8 nm. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use an optical guide layer having a thickness equal to or more than 8 nm, in Schetzina's device, in order to optimize the characteristics of the device according to the requirements of the application in hand.

Regarding claim 211, Schetzina teaches in the embodiment of figure 5 a p-type clad layer is not continuously graded (see figure 6A).

Regarding claim 215, Schetzina teaches in the embodiment of figure 5 a p-type clad layer comprises one or more discrete electron energy levels (see figure 6A).

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Regarding claims 206-209, Schetzina teaches in figure 3 and related text a semiconductor light emitting device comprising:

- an active layer 112 InGaN made of a first nitride III-V compound semiconductor containing In and Ga;

- an optical guide layer GaN in contact with the active layer and made of a second nitride III-V compound semiconductor containing Ga (column 10, lines 31-34);

- a cap layer AlGaN 114a in contact with the optical guide layer and made of a third nitride III-V compound semiconductor containing Al and Ga; and

- a p-type clad layer AlGaN 122a in contact with the cap layer and made of a fourth nitride III-V compound semiconductor containing Al and Ga and different from the third nitride III-V compound semiconductor, wherein

- the p-type clad layer comprises a superlattice clad layer, the cap layer has a band gap always larger than that of the p-type clad layer (see figure 6A), and wherein the cap layer is  $\text{Al}_y\text{Ga}_{1-y}\text{N}$  (where  $0 \leq y < 1$ ).

Schetzina does not teach the thickness of the cap layer, which is located between the active layer and the cladding layer.

Schetzina teaches in the embodiment of figure 30 the thickness of the active layer 112c as being between 3-10 nm, and the thickness of the barrier layer 112a located between the active layer and the cladding layer 114c as being 20-100 nm.

Ibbetson et al. teach in the embodiment of figure 3A the thickness of the cladding layer 4 between 1-100 nm.

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It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a cap layer, located between the cladding layer and the active layer, having a thickness between 2-20 nm, in Schetzina's device, in order to reduce the size of the device without compromising the characteristics of the device, and in order not to deviate from the disclosed thicknesses of the various layers which determine the overall size of Schetzina's device.

It has been held in that the applicant must show that a particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Note that the law is replete with cases in which when the mere difference between the claimed invention and the prior art is some dimensional limitation or other variable within the claims, patentability cannot be found. The instant disclosure does not set forth evidence ascribing unexpected results due to the claimed dimensions. See Gardner v. TEC Systems, Inc., 725 F.2d 1338 (Fed. Cir. 1984), which held that the dimensional limitations failed to point out a feature which performed and operated any differently from the prior art.

Note that the cap layer has a band gap always larger than that of the p-type clad layer, because as depicted in figure 4A, the p-type clad layer always has an average band gap which is larger than that of the p-type clad layer.

Note further that the broad recitation of the claim does not require the layers to be in direct contact with each other.



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Regarding claim 208, Schetzina teaches in the embodiment of figure 3 substantially the entire claimed structure, as applied to claim 206 above, except an undoped optical guide layer. Schetzina teaches in the embodiment of figure 29 an undoped optical guide layer 124c. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use an undoped optical guide layer in Schetzina's device in order to use the device in an application which requires an undoped optical guide layer.

Regarding claim 209, Schetzina does not teach an optical guide layer having a thickness equal to or more than 8 nm. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use an optical guide layer having a thickness equal to or more than 8 nm, in Schetzina's device, in order to optimize the characteristics of the device according to the requirements of the application in hand.

### ***Response to Arguments***

Applicant argues that there is support in the embodiment of figure 7 for a cap layer having a band gap always larger than that of the p-type clad layer, as recited in claim 206.

Applicant recites in paragraph [234] that in the 9<sup>th</sup> and the 56<sup>th</sup> aspects of the invention, the cap layer has a band gap always larger than that of the p-type clad layer

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is. However, there is no explicit recitation that the embodiment of figure 6 is one of the 9<sup>th</sup> aspect or the 56<sup>th</sup> aspect of the invention.

Applicant argues that prior art does not teach a p-type clad layer comprises a superlattice clad layer.

Schetzina teaches in figures 3 and 5 and related text a p-type clad layer AlGaIn 122a/222a comprises a superlattice clad layer. Applicant does not explain why p-type clad layer AlGaIn 122a/222a of Schetzina is not a superlattice clad layer.

Applicant argues that Schetzina neither discloses nor suggests that the cap layer has a band gap that is always larger than that of the p-type clad layer, because claim 206 requires that the cap layer has a band gap that is always larger than that of the p-type clad layer, not an average band gap which is larger than that of the p-type clad layer, as argues by the examiner.

The broad recitation of the claim does not require that all the points along the entire cap layer have a band gap always larger than that of the p-type clad layer. If part of the band gap of the cap layer, or the average band gap of the cap layer is always larger than that of the p-type clad layer, then it reads on the claim.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ori Nadav whose telephone number is 571-272-1660. The examiner can normally be reached between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on 571-272-1869. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



O.N.  
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